AN OCCUPATIONAL EXPOSURE ASSESSMENT OF POLYCHLORINATED DIBENZO-*p*-DIOXIN AND DIBENZOFURANS IN FIREFIGHTERS

Jing-Fang Hsu, *National Cheng Kung University, Taiwan*
How-Ran Guo, *National Cheng Kung University, Taiwan*
Pao-Chi Liao, *National Cheng Kung University, Taiwan*

Background and Aims: Polychlorinated dibenzo-*p*-dioxins and dibenzofurans (PCDD/Fs) are unintentional byproducts of combustion and industrial processes. Firefighters face the risk of occupational exposure to PCDD/Fs. A survey of the PCDD/F levels in firefighters was conducted. Furthermore, we intended to identify potential risk factors associated with the exposure to high PCDD/F levels in firefighters and confirm the presence of high PCDD/F levels in fire accidents.
Methods: Congener-specific analyses of 17 PCDD/Fs were performed on 20 serum samples collected from firefighters and fire scene investigators, and four soot samples that had deposited on the surfaces of the fire helmets and were collected after the firefighters had fought fires.
Results: The PCDD/F concentrations on the helmets that were contaminated by being worn at the fire scenes were 63 - 285 times higher than those on a clean helmet. The median serum PCDD/F concentration of the 16 firefighters (12 pg WHO_{2005}-TEQ g^{-1} lipid) was not different from those of the males from the general Taiwanese population (9.4 pg WHO_{2005}-TEQ g^{-1} lipid). However, the median PCDD/F level in the four fire scene investigators (15 pg WHO_{2005}-TEQ g^{-1} lipid) was higher than those in the male from the general Taiwanese population (Mann-Whitney U test, $p < 0.01$). Furthermore, the serum samples from the firefighters and fire scene investigators, and the soot samples from the fire scenes presented similarly distinctive PCDD/F profiles that had elevated proportions for 10 PCDF congeners.
Conclusions: Firefighters face an elevated risk of occupational exposure to PCDD/Fs due to the large amounts of PCDD/Fs deposited on the surfaces of the fire helmets at the fire scene. The firefighters' thermal protective uniforms provided a protective barrier for exposure to PCDD/Fs. However, the fire scene investigators may have had more occupational exposures to PCDD/Fs due to poor personal protection; however, this requires further investigation.